# 3.9 Air Quality and Climate

This section presents a description of the air quality and climate in the area associated with the Proposed Action. For this discussion, the Study Area is defined as Lake, Cook, DuPage, Will, McHenry, Kane, Kendall, and Grundy counties in Illinois and Lake and Porter counties in Indiana. Current air quality nonattainment designations in the Chicago area include all or a part of each of these ten counties.

Air quality generally is determined by comparing monitored pollutant concentrations with prescribed standards. The maximum level of a pollutant considered to be acceptable is specified by the U.S. Environmental Protection Agency (EPA). The Clean Air Act (CAA) established two types of National Ambient Air Quality Standards (NAAQS): primary standards set limits to protect public health, and secondary standards set limits to protect public welfare (42 USC 7409). The EPA Office of Air Quality Planning and Standards has set NAAQS for the following six criteria pollutants: ozone ($O_3$), nitrogen dioxide ($NO_2$), carbon monoxide (CO), sulfur dioxide ($SO_2$), respirable particulate matter ($PM_{10}$ and $PM_{2.5}$), and lead (Pb). Ambient air quality standards adopted by Illinois and Indiana are no more stringent than the national standards. Table 3.9-1, below, shows the NAAQS for these pollutants, expressed in parts per million (ppm) by volume, milligrams per cubic meter of air ($mg/m^3$), and micrograms per cubic meter of air ($\mu g/m^3$). To determine compliance with NAAQS, concentrations of pollutants are measured hourly at a given location and then averaged over a specified duration (ranging from one hour to one year, depending on the pollutant and standard) for comparison with the applicable standard.

| Table 3.9-1. National Ambient Air Quality Standards | | | |
|---|---|---|---|
| **Pollutant** | **Primary Standards** | **Averaging Times** | **Secondary Standards** |
| Carbon Monoxide | 9 ppm (10 mg/$m^3$) | 8-hour[a] | None |
| | 35 ppm (40 mg/$m^3$) | 1-hour[a] | None |
| Lead | 1.5 µg/ $m^3$ | Quarterly Average | Same as Primary |
| Nitrogen Dioxide | 0.053 ppm (100 µg/ $m^3$) | Annual (Arithmetic Mean) | Same as Primary |
| Particulate Matter ($PM_{10}$) | 50 µg/ $m^3$[b] | Annual[b] (Arithmetic Mean) | 50 µg/ $m^3$[b] |
| | 150 µg/ $m^3$ | 24-hour[c] | Same as Primary |
| Particulate Matter ($PM_{2.5}$) | 15.0 µg/ $m^3$ | Annual[d] (Arithmetic Mean) | Same as Primary |
| | 35 µg/ $m^3$ | 24-hour[e] | Same as Primary |
| Ozone | 0.075 ppm (2008 standard) | 8-hour[f] | Same as Primary |
| | 0.08 ppm (1997 standard) | 8-hour[g] | Same as Primary |
| | 0.12 ppm | 1-hour[h] (Applies only in limited areas) | Same as Primary |
| Sulfur Dioxide | 0.03 ppm | Annual (Arithmetic Mean) | [see below] |
| | 0.14 ppm | 24-hour[a] | [see below] |
| | [see above] | 3-hour[a] | 0.5 ppm (1300 µg/$m^3$) |

Source: EPA (2008b), "National Ambient Air Quality Standards (NAAQS)," Air and Radiation, retrieved on March 13, 2008, http://www.epa.gov/air/criteria.html, March 2008.

Notes:

[a] Not to be exceeded more than once per year

[b] Because of a lack of evidence linking health problems to long-term exposure to coarse particle pollution, EPA revoked the annual $PM_{10}$ standard in 2006 (effective December 17, 2006). Standard listed is a state (Illinois and Indiana) standard only.

[c] Not to be exceeded more than once per year on average over three years

[d] To attain this standard, the three-year average of the weighted annual mean $PM_{2.5}$ concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/$m^3$.

[e] To attain this standard, the three-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/$m^3$ (effective December 17, 2006). In September 2006, EPA revised the 24-hour $PM_{2.5}$ standard from 65 µg/ $m^3$ to 35 µg/ $m^3$, but the previous standard is applicable until EPA completes the attainment designation and implementation process. During any 12 consecutive months, 98 percent of the values shall not exceed 35 µg/ $m^3$ under the new standard, or 65 µg/ $m^3$ under the currently applicable standard.

[f] To attain this standard, the three-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm. This new standard will be effective 60 days after publication in the Federal Register.

[g] To attain this standard, the three-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm. The 1997 standard--and the implementation rules for that standard--will remain in place for implementation purposes as EPA undertakes rulemaking to address the transition from the 1997 ozone standard (0.08 ppm) to the 2008 ozone standard (0.075 ppm).

[h] The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is less than or equal to 1. As of June 15, 2005, EPA revoked the 1-hour ozone standard in all but 14 areas designated as 8-hour ozone nonattainment Early Action Compact Areas. The 1-hour ozone standard does not apply to the Study Area; see Section 3.9.1.1, below.

## 3.9.1 Existing Air Quality Conditions

This section presents a discussion of the existing air quality and attainment status of the Study Area. Information on ambient air monitoring for this area also is provided.

**What is attainment?**
Attainment is compliance with the NAAQS promulgated under the Clean Air Act.

Throughout the Study Area, pollutants are measured by numerous air monitoring stations. The air monitoring stations in the Illinois counties are operated by the Illinois Environmental Protection Agency (IEPA) or the Cook County Department of Environmental Control (IEPA 2007a). The monitors in Lake County, Indiana, are operated by the Indiana Department of Environmental Management (IDEM) (IDEM 2007). These monitoring stations are used in part to determine attainment status for the criteria pollutants included in Table 3.9-1, above.

The following discussion includes a summary of the attainment status of the Study Area for each of the criteria pollutants and a summary of the monitoring data for these pollutants for 2004 through 2006. Unless otherwise noted, the area attainment status information is from the EPA Green Book website (www.epa.gov/air/oaqps/greenbk/), and monitoring data are from the EPA AirData website (www.epa.gov/air/data/index.html) (EPA 2008c and 2008d).

### *3.9.1.1 Ozone*

Ozone ($O_3$) is a photochemical oxidant and the major component of smog. While ozone in the upper atmosphere benefits life by shielding the Earth from harmful ultraviolet radiation from the sun, high concentrations of ozone at ground level are a major health and environmental concern. Ozone is not emitted directly into the air, but is formed through complex chemical reactions between precursor emissions of volatile organic compounds (VOC) and oxides of nitrogen ($NO_x$) in the presence of sunlight. These reactions are stimulated by sunlight and temperature so that peak ozone levels typically occur during warmer times of the year. Both VOCs and $NO_x$ are emitted by transportation and industrial sources. VOCs are emitted from sources as diverse as motor vehicle traffic, chemical manufacturing, dry cleaners, paint shops, and other sources using solvents (EPA 2008e).

**What are $NO_x$ and $NO_2$?**
Most combustion processes emit nitrogen oxides ($NO_x$) primarily in the form of nitrogen oxide (NO) and to a lesser degree in the form of $NO_2$. The emitted NO then converts to $NO_2$ in the atmosphere as the emissions disperse downwind of a source. While compliance with the NAAQS is measured as $NO_2$, the emissions from sources are typically measured as $NO_x$ (the sum of NO and $NO_2$ emitted).

All ten counties in the Study Area are, in whole or in part, classified "moderate" nonattainment for the 8-hour ozone standard, with a designation date of June 15, 2004.[1] They are a part of the Chicago-Gary-Lake County, Illinois-Indiana, ozone nonattainment area. This ozone nonattainment area includes Lake and Porter counties in Indiana, and in Illinois Lake, Cook, DuPage, Will, McHenry, and Kane Counties, Oswego Township in Kendall County, and Aux Sable and Goose Lake townships in Grundy County. This area is required to achieve attainment status by June 2010. Figure 3.9-1, below, shows the ozone nonattainment area in the greater Chicago metropolitan area, along with existing CN and EJ&E rail lines that are part of the Proposed Action.

[1] Ozone nonattainment areas are assigned a classification in accordance with the severity of the monitored values in relationship to the NAAQS. The 8-hour ozone nonattainment designations include the categories basic, marginal, moderate, serious, severe, and extreme. As discussed below in this section, the EPA has issued new ozone standards, but will not make final attainment designations under the new standards until 2010.


**Figure 3.9-1**

**$PM_{2.5}$ and Ozone Nonattainment Areas**

This area was previously designated "severe" nonattainment under the 1-hour ozone standard. On June 15, 2005, the 1-hour ozone standard was revoked by EPA for all areas except 8-hour ozone nonattainment Early Action Compact Areas (EAC). Because the Chicago-Gary-Lake County area is not an EAC, as of June 15, 2005, the 1-hour ozone standard does not apply to this area.

IDEM submitted a request for redesignation for ozone attainment in the 8-hour ozone nonattainment area for Lake and Porter counties, Indiana, to EPA on September 12, 2006 (IDEM 2006a). It also submitted a maintenance plan designed to keep Lake and Porter counties and the Chicago-Gary-Lake County ozone nonattainment area in attainment of the 8-hour ozone NAAQS through 2020. EPA issued a notice of proposed rulemaking to approve the redesignation in the Federal Register on May 31, 2007 (FR 2007b). The agency also proposed to approve the ozone maintenance plan as a revision to the State Implementation Plan (SIP). As part of the maintenance plan, EPA proposed to approve the VOC and $NO_x$ Motor Vehicle Emission Budgets for Lake and Porter counties shown in Table 3.9-2, below.

**Table 3.9-2. Lake and Porter Counties, Indiana, Mobile Emission Budgets**

| Pollutant | 2010 | 2020 |
|---|---|---|
| VOC (tons/day)[a] | 11.5 | 6.00 |
| NOx (tons/day)[a] | 40.6 | 12.60 |

Source: IDEM (2006a), *Request for Redesignation and Maintenance Plan for Ozone Attainment in the 8-Hour Ozone Nonattainment Area--Lake and Porter Counties, Indiana*, Retrieved on May 8, 2008, http://www.in.gov/idem/programs/air/redesignations/lakeporter/lakeporterfinal.pdf, September 2006.

Note:

[a] The basis for the emission budgets is an estimated 21,194,922 vehicle miles traveled (VMT) per day in 2010 and an estimated 24,958,812 VMT per day in 2020. The budget emission values include a 5 percent margin for error.

The notice of proposed rulemaking (NPR) also provides EPA's determination that the 8-hour ozone NAAQS has been attained in the Chicago-Gary-Lake County area. The NPR includes information showing that the 8-hour ozone NAAQS was attained using monitoring data from 2004 to 2006, with the highest three-year average of the fourth-highest daily maximum concentration being 0.076 ppm, compared with the 0.08 standard. The NPR went on to indicate that if, through court actions, the 1-hour ozone standard were to be reinstated, the Chicago-Gary-Lake County area is also in attainment with the 1-hour ozone standard. Through this rulemaking, EPA also is proposing to classify Indiana's Lake and Porter counties in attainment for the 1-hour ozone NAAQS if that standard is reinstated. Note that the redesignation request was submitted by IDEM for Lake and Porter counties in Indiana and does not change the ozone nonattainment classification for counties in Illinois. If this proposed rule is made final, Lake and Porter counties in Indiana would be considered a maintenance area for ozone.

Because the redesignation request discussed above was made by IDEM, it addressed only the Indiana portion of the Chicago-Gary-Lake County nonattainment area and included mobile emission budgets only for Lake and Porter counties in Indiana. While an SIP submittal for the Illinois portion of the 8-hour ozone nonattainment area was not found, a submittal related to the Illinois portion of the 1-hour ozone nonattainment area included 2007 motor vehicle emission budgets. These 2007 motor vehicle emissions budgets, which received a positive adequacy determination by EPA, are 127.42 tons per day and 280.40 tons per day for VOC and $NO_x$, respectively (EPA 2003a).

On March 12, 2008, EPA announced that the 8-hour ozone NAAQS was being revised to 0.075 ppm from 0.08 ppm. The information provided with this announcement indicated attainment status for this revised standard probably will be designated based on data from 2006 to 2008 or later. Based on data for the 2004 to 2006 period, three counties in the Study Area had monitored values greater than the new 8-hour ozone NAAQS. These three counties are Lake County, Illinois, and Lake County and

Porter County, Indiana, with monitored values of 0.076, 0.077, and 0.076 ppm, respectively. In Illinois, Cook, DuPage, Will, McHenry, and Kane counties all had 2004 to 2006 monitored values equal to or less than the new NAAQS, with values of 0.075, 0.068, 0.071, 0.070, and 0.072 ppm, respectively. No data were provided for Kendall and Grundy counties in Illinois. It is important to note that these 2004 to 2006 data are given for information purposes only and would not be used by EPA to make nonattainment designations under the new standard.

By March 2009, states must provide EPA with recommendations for attainment status designations for the revised 8-hour ozone standard within their borders. EPA is to issue final designations on attainment classification status by March 2010, unless there is insufficient information to make the designations, in which case the deadline may be extended by one year. Within three years of EPA issuing its final designations, states must submit SIPs outlining how attainment status will be achieved for those areas classified as nonattainment. If EPA makes the designations in March 2010, SIPs would be due by March 2013.

The actions needed to address the issues associated with attainment of the 8-hour ozone standard are ongoing. However, the EPA proposal described above illustrates the progress in reducing ozone levels in the Chicago metropolitan area over the last few years.

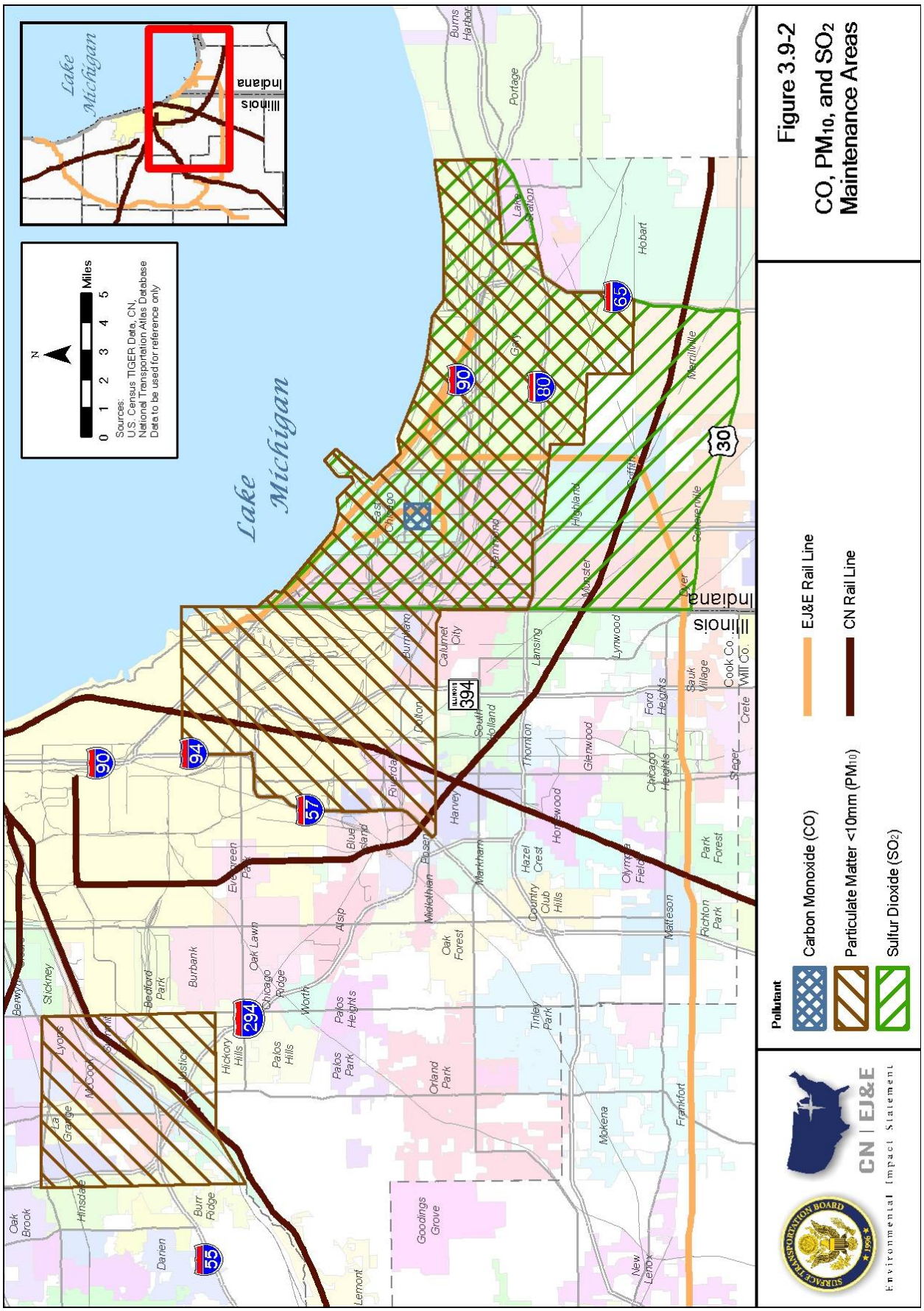
#### 3.9.1.2 Nitrogen Oxides

The counties in the Study Area are in attainment or are unclassifiable for the nitrogen oxide ($NO_{2)}$ NAAQS. Further, all counties in Illinois and Indiana are designated attainment or unclassifiable for $NO_2$. The highest monitored annual average $NO_2$ concentration in the Study Area for 2004 to 2006 is 0.031 ppm, compared with the standard of 0.053 ppm. Note that nitrogen oxides are considered a precursor to ozone and are treated as a nonattainment pollutant for ozone nonattainment areas.[2]

#### 3.9.1.3 Carbon Monoxide

The counties in the Study Area are in attainment or are unclassifiable for all carbon monoxide (CO) NAAQS. Further, all counties in Illinois and Indiana are designated attainment or unclassifiable for CO. From 2004 to 2006, the maximum CO concentration in the Study Area measured 6.2 ppm averaged over one hour and 3.7 ppm over eight hours. This compares with the CO standard of 35 ppm for the 1-hour average and 9 ppm for the 8-hour average. A portion of Lake County, Indiana, was classified nonattainment for CO for 1992 through 1999. The area is described as part of the City of East Chicago (an area bounded by Columbus Drive on the north, the Indiana Harbor Canal on the west, 148th Street if extended on the south, and Euclid Avenue on the east). Redesignation of this area as attainment for CO was effective March 20, 2000. This area is considered a CO maintenance area. Figure 3.9-2, below, shows the CO maintenance area, along with existing CN and EJ&E rail lines that are part of the Proposed Action.

[2] The Chicago 1-hour ozone nonattainment area had an $NO_x$ waiver, whereby it was determined that reducing $NO_x$ emissions in the nonattainment area would not reduce ozone levels in the area and $NO_x$ was not treated as a nonattainment pollutant in the area. However, this $NO_x$ waiver does not transfer to the area under the 8-hour ozone nonattainment designation, and $NO_x$ will be treated as a nonattainment pollutant unless a separate $NO_x$ waiver is granted.


Lake Michigan
Illinois
Indiana
N
0 1 2 3 4 5 Miles
Sources:
U.S. Census TIGER Data, CN,
National Transportation Atlas Database
Data to be used for reference only
Figure 3.9-2
CO, PM10, and SO2
Maintenance Areas
Pollutant
Carbon Monoxide (CO)
Particulate Matter <10mm (PM10)
Sulfur Dioxide (SO2)
EJ&E Rail Line
CN Rail Line
CN | EJ&E
Environmental Impact Statement
SURFACE TRANSPORTATION BOARD
1966

### 3.9.1.4 Sulfur Dioxide

The counties in the Study Area are in attainment or are unclassifiable for all sulfur dioxide ($SO_2$) NAAQS. Further, all counties in Illinois and Indiana are designated attainment or unclassifiable for $SO_2$. From 2004 to 2006, the maximum $SO_2$ concentration in the Study Area measured 0.164 ppm averaged over three hours, 0.069 ppm averaged over 24 hours, and 0.007 ppm as an annual average. This compares with the $SO_2$ standard of 0.5 ppm for the 3-hour average, 0.14 ppm for the 24-hour average, and 0.03 ppm for the annual average. A part of Lake County, Indiana was classified nonattainment for $SO_2$ from 1992 through 2005, but was redesignated attainment effective October 26, 2005 (FR 2005a). This area, which is now considered an $SO_2$ maintenance area, is defined as the area bounded on the north by Lake Michigan, on the west by the Indiana-Illinois state line, on the south by US 30 from the state line to the intersection of I-65 then following I-65 to the intersection of I-94 then following I-94 to the Lake-Porter county line, and on the east by the Lake-Porter county line. Figure 3.9-2, above, shows the $SO_2$ maintenance area, along with existing CN and EJ&E rail lines that are part of the Proposed Action.

### 3.9.1.5 $PM_{10}$

The counties in the Study Area are in attainment or are unclassifiable for the $PM_{10}$ NAAQS. Further, statewide, all counties in Illinois and Indiana are designated attainment or unclassifiable for $PM_{10}$. Two areas of Cook County, Illinois, were designated nonattainment for $PM_{10}$ in 1992 through 2005. These areas are labeled Southeast Chicago and Lyons Township (Calumet Lake area). Both of these areas were redesignated attainment effective November 21, 2005. A portion of Lake County, Indiana that includes the cities of East Chicago, Hammond, Whiting, and Gary was classified nonattainment for $PM_{10}$ for 1992 through 2002. This area was redesignated attainment for $PM_{10}$ effective March 11, 2003. As part of the redesignation process for these former nonattainment areas, EPA approved the maintenance plan for each area (FR 2005b, 2005c, and 2003). Southeast Chicago is defined as the area bounded on the north by 79th Street, on the west by I-57 between Sibley Boulevard and I-94 and by I-94 between I-57 and 79th Street, on the south by Sibley Boulevard, and on the east by the Illinois-Indiana state line. Figure 3.9-2, above, shows the $PM_{10}$ maintenance areas, along with existing CN and EJ&E rail lines that are part of the Proposed Action.

### 3.9.1.6 $PM_{2.5}$

EPA initially promulgated annual and 24-hour $PM_{2.5}$ NAAQS in July 1996. In September 2006, EPA revised the standards. The 2006 revisions tightened the 24-hour standard, lowering it from 65 µg/ $m^3$ to 35 µg/ $m^3$, and retained the annual standard at 15.0 µg/ $m^3$. Table 3.9-3, below, provides a summary of the timeline associated with the two dates.

| Table 3.9-3. $PM_{2.5}$ NAAQS Timetable | | |
|---|---|---|
| **Milestone** | **1997 $PM_{2.5}$ Primary NAAQS** | **2006 $PM_{2.5}$ Primary NAAQS** |
| Promulgation of Standard | July 1997 | Sept. 2006 |
| Effective Date of Standard | Sept. 1997 | Dec. 18, 2006 |
| State Recommendations to EPA | Feb. 2004 (based on 2001-2003 monitoring data) | Dec. 18, 2007 (based on 2004-2006 monitoring data) |
| Final Designations Signature | Dec. 2004 | No later than Dec. 18, 2008[a] |
| Effective Date of Designations | April 2005 | Typically no later than 90 days after publication in the Federal Register |
| SIPs Due | April 2008 | 3 years after effective date of designations |
| Attainment Date | April 2010 (based on 2007-2009 monitoring data) | No later than 5 years after effective date of designations |
| Attainment Date with Extension | Up to April 2015 | No later than 10 years from effective date of designations |

Source: EPA (2008f), "PM Standards Revision – 2006," *Particulate Matter*, retrieved on February 28, 2008, http://www.epa.gov/oar/particlepollution/naaqsrev2006.html, February 2008.

Note:

[a] In the event that the Administrator has insufficient information to promulgate the designations by December 18, 2008, the date of final designations may be extended up to one year.

As seen in Table 3.9-3, above, actions associated with the $PM_{2.5}$ standards are ongoing, with major milestones anticipated in the 2008 to 2010 timeframe. All ten counties in the Study Area are, in whole or in part, classified nonattainment for the annual $PM_{2.5}$ standard. They make up the Chicago-Gary-Lake County annual $PM_{2.5}$ nonattainment area. This nonattainment area includes Lake County and Porter County in Indiana, and Lake County, Cook County, DuPage County, Will County, McHenry County, Kane County, Oswego Township in Kendall County, and Aux Sable Township and Goose Lake Township in Grundy County in Illinois. Figure 3.9-1, above, shows the $PM_{2.5}$ nonattainment area in the greater Chicago metropolitan region, along with existing CN and EJ&E rail lines that are part of the Proposed Action. The $PM_{2.5}$ nonattainment area is identical to the existing 8-hour ozone nonattainment area.

#### *3.9.1.7 Air Toxics*

In addition to the criteria air pollutants for which there are NAAQS, EPA also regulates air toxics. Most air toxics originate from human-made sources, including on-road mobile sources, non-road mobile sources, area sources (such as dry cleaners), and stationary sources (such as factories or refineries). The Federal Highway Administration (FHWA) has prepared guidance on the analysis of mobile source air toxics (MSATs) for highway projects (FHWA 2006). In this guidance, FHWA recommends either no analysis, qualitative analysis, or quantitative analysis, depending on the magnitude of project-related traffic.

MSATs are a subset of the 188 air toxics defined by the CAA. MSATs are compounds emitted from highway vehicles and non-road equipment. Some toxic compounds present in fuel are emitted to the air when the fuel evaporates or passes through the engine unburned. Other toxics are emitted from the incomplete combustion of fuels or as secondary combustion products. Metal air toxics also result from engine wear or impurities in oil or gasoline (FHWA 2006).

EPA is the lead federal agency for administering the CAA and has certain responsibilities regarding the health effects of MSATs. EPA issued a *Final Rule for the Control of Hazardous Air Pollutants*

*from Mobile Sources* (FR 2007c), in which it examined the impact of existing and newly promulgated mobile source emission control and fuel quality programs on emissions of MSATs. EPA projects that between 1999 and 2030, even with a 57 percent increase in highway vehicle miles traveled (VMT) and higher levels for other sectors, emissions control programs will reduce MSATs substantially nationwide.

According to EPA estimates, the lifetime cancer risk from all sources of air pollution ranges from one to 25 cases per million people in rural areas, and from 25 to 50 cases per million people in urban areas. These risks compare with an overall lifetime cancer risk from all causes of 333,000 cases per million people. Although little is known about the existing levels of MSATs in the Study Area, it is apparent, based on the nationwide reductions forecast by EPA, that MSAT concentrations and associated risks generally should decline in coming decades, even with substantial growth in mobile and stationary source activity.

## 3.9.2 Existing Climate Conditions

Both Illinois and northern Indiana have relatively temperate climates with cold, snowy winters and hot, wet summers. Summers are dominated by warm, humid air with highs generally in the low 80s. Summer also is the wettest season of the year, with about 3 to 4 inches of rainfall a month. Winters generally are dominated by Pacific air, but occasionally arctic air moves in, causing much colder temperatures. The average highs in the winter months typically are in the low 30s. Winter months generally see 1 to 2 inches of precipitation as a mixture of rain and snow (Wendland 2005).

At the Midway Airport meteorological station in Chicago, the average annual temperature from 1971 to 2000 was 51°F, and the average annual precipitation was 38.35 inches. The average annual snowfall for these same years was 43.1 inches. Also at the Midway Airport meteorological station, the one-day maximum and minimum temperatures for 1928 through 2006 are 107°F and –25°F, respectively. The average number of days with a high temperature greater than 90°F was approximately 21 days per year, and approximately eight days per year had a low temperature below 0°F. The highest one-day precipitation for the period was 6.16 inches, and the highest one-day snowfall was 17.6 inches (Angel 2008).

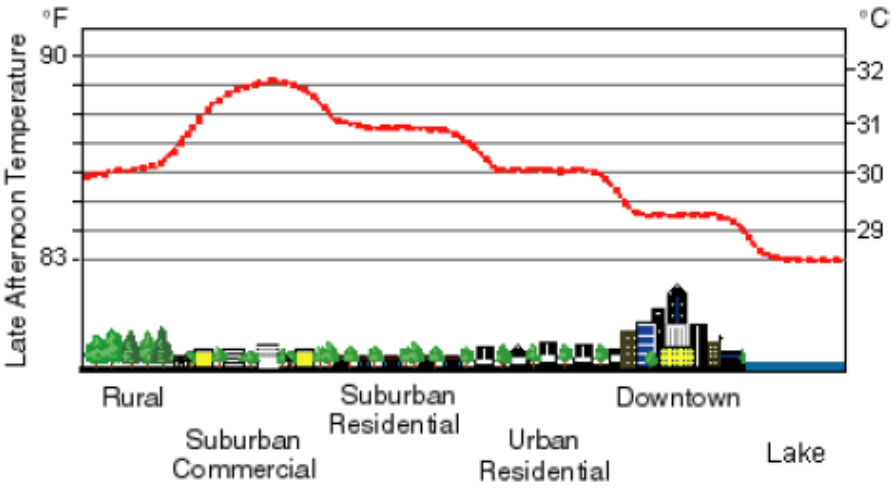
### *3.9.2.1 Urban Heat Island Effect*

In larger metropolitan areas there is a recognized urban heat island (UHI) effect. The UHI effect is used to describe situations in which urban and suburban areas are 2°F to 10°F warmer than the surrounding area (EPA 2008g). Heat islands form when cities replace natural land cover with pavement, buildings, and other infrastructure. These changes can contribute to higher urban temperatures in the following ways (EPA 2008g):

- The displacement of trees and vegetation minimizes the natural cooling effect of shading and evaporation of water from soil and leaves
- Tall buildings and narrow streets can heat air trapped between them and reduce air flow
- Waste heat from vehicles, factories, and air conditioners may add warmth to their surroundings

Because heat is retained in roads, buildings, and other structures longer than in surrounding rural areas, the UHI effect often is greatest about three to five hours after sunset (EPA 2008g). For example, a study of the Chicago UHI effect showed that the effect consistently appeared in the western suburbs. Figure 3.9-3, below, shows a sketch of the UHI effect in Chicago. The fact that the downtown area is not the core of the Chicago heat island probably is caused by the moderating influence of Lake Michigan (Gray and Finster 2000).

Figure 3.9-3. Sketch of Chicago's Heat Island Profile




Source: Gray, Kimberly A., and Mary E. Finster, "The Urban Heat Island, Photochemical Smog, and Chicago: Local Features of the Problem and Solution," Department of Engineering, Northwestern University, submitted to Atmospheric Pollution Prevention Division, U.S. Environmental Protection Agency, available online at http://www.epa.gov/heatisld/resources/publications.html, 2000.

#### *3.9.2.2 Global Climate Change*

In contrast to the localized temperature differences caused by the UHI effect, global climate change is a term used to describe the gradual increase or decrease in worldwide average surface temperatures, or changes in precipitation, wind, or other climate variables. While the level of human vs. natural contribution to global climate change is the subject of much debate, the reality is that global climate change has become one of today's primary environmental issues. The main human contributions to global climate change are attributed to the emissions of what are commonly referred to as greenhouse gases (GHGs), such as carbon dioxide, and to changes in land cover and land use that can affect the amount of carbon dioxide taken up or released by the land surface.

Governor Rod Blagojevich of Illinois created the Illinois Climate Change Advisory Group by executive order in 2006 (IEPA 2007b). The purpose of the group is to consider policies and strategies to reduce GHG emissions in Illinois and make recommendations to the governor. Final recommendations to the governor were approved at the July 10 and September 6, 2007, meetings of the group, with the recommendations divided into subgroups of Transport, Power/Energy, Cap and Trade (relating to programs and requirements for power generation and large industrial sources), and Commercial, Industrial, and Agricultural (IEPA 2007c). No final GHG rules were identified that would potentially affect the Proposed Action.

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